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Journal of the Society of Arts.

FRIDAY, AUGUST 12, 1859.

PROGRAMME OF EXAMINATIONS FOR 1860.

The following is the Programme, copies of which have been already forwarded to all the Institutions in Union, and to each Local Board. Additional copies, where required, may be had on application to the Secretary of the Society of Arts, Adelphi, London, W.C.

PRELIMINARY NOTICE.

1. The primary object of the Examinations described in the following programme is to encourage, test, attest, and reward efforts made for self-improvement by adult members and students of the Mechanics Institutions, Athenæums, People's Colleges, Village Classes, and other bodies of the like character, that are in Union with the Society of Arts. Such members and students are commonly mechanics, artisans, labourers, clerks, tradesmen and farmers not in a large way of business, apprentices, sons and daughters of tradesmen and farmers, assistants in shops, and others, of various occupations, who are commonly not graduates nor undergraduates of any University, nor following, nor intending to follow, a learned profession. To all such, male and female (not being under sixteen years of age), the Examinations are open on the general conditions explained in this programme. (See Terms of admission to Examinations. See paragraphs 87 to 93.)

2. Other persons, however, of a higher grade of Society, who have enjoyed superior advantages of Education, are desirous to avail themselves of the Examinations, in order that their attainments may be tested and attested by the Society's Board of Examiners. The Council is unwilling to exclude from its Examinations any one that may derive advantage from them; and therefore notice is now given that persons not belonging to the classes of society first described as those for whom the Examinations are primarily designed, and not being less than *eighteen* years of age, may be admitted to the Examinations, and receive certificates, on the conditions set forth in the paragraphs 3, 92, and 100 of this programme.

3. No such person, however, and no certified school-master or mistress, and no pupil teacher, can compete for any of the Prizes hereinafter offered by the Society of Arts.

4. The Society's Examinations were held, in 1856, at the Society's House in London; in 1857, at the Society's House and at Huddersfield; in 1858, at the 39 places, and, in 1859, at the 54 places, which are specified in the Appendix to this programme, page 23.

5.—In 1860, and thenceforth, it is proposed to hold the Examinations simultaneously throughout the United Kingdom wherever suitable arrangements can be made by the authorities of the Institutions.

6.—Bearing in mind that the Union of Institutions was formed for the purpose, not of superseding, but of promoting and supplementing, the action and self-government of those bodies, the Council of the Society of Arts invites them to assume a large share of authority and responsibility in carrying out the following scheme of

Previous	} Examinations by {	Local Boards.
Final		the Society of Arts.

LOCAL BOARDS.

7. The Managers of Institutions in Union with the Society of Arts, and others who may be desirous to co-operate

with the Society in promoting the instruction of adults, are invited to form Local Boards. Each Local Board must consist of at least three members; and, with advantage, may be much more numerous. There must be a Secretary, and there should be a Chairman. The district for which the Board is to act should be defined; and every Institution for the promotion of the instruction of adults, within those limits, ought to be represented in the Board. It is very desirable that each Local Board should include the representatives of more Institutions than one; and that there should not be more than one Local Board in each locality. The composition of the Board must be such as to command the respect and confidence of the neighbourhood. Where gentlemen of high literary and scientific attainments are willing to serve on the Board, their service is of great value; but the necessary work of the Board may be done by any well-educated persons of high character and good sense. Where a Local Board embraces a district so large that the candidates cannot conveniently attend at one place to be examined, arrangements should be made for the Board's action by deputations in different parts of the district.

8. Every Local Board, that is intended to co-operate with the Society of Arts in carrying the scheme of Examinations into effect, should submit to the Council of the Society, on or before the 1st of January, 1860, a List of the Chairman, Secretary, and other members of the Board.

PREVIOUS EXAMINATIONS BY THE LOCAL BOARDS.

9.—The Local Boards will conduct the previous Examinations of their own Candidates, and also supervise the working of papers which the Society's Examiners will set for the Society's final Examinations.

10.—No Candidate can be admitted to the final Examination without a certificate (see Form No. 4 in Appendix) from his Local Board, that he has satisfactorily "passed" its previous Examination in the elementary subjects specified in pars. 12, 13, 14, 15, and in the special subjects in which he wishes to be examined by the Society's Examiners.

11.—The previous Examinations must be held by the Local Boards sufficiently early in the year, to allow the results to be communicated to the Council on or before the 10th of April, 1860, *i.e.*, four weeks before the 8th of May, the day fixed for the commencement of the Society's final Examinations.

12.—The previous Examinations by the Local Boards may be either wholly written, or partly oral and partly written, as each Local Board may think best. These Examinations are to test the handwriting and spelling of the Candidates, their knowledge of English grammar, composition, and the common rules of arithmetic, as well as their knowledge of those special subjects in which they seek to be examined by the Society's Examiners.

13.—**HANDWRITING.**—A bold, even round-hand, without loops, long tails, or flourishes, should be preferred.

14.—**SPELLING, ENGLISH GRAMMAR, AND COMPOSITION.** An extract from some standard English author should be set, into which errors of spelling, grammar, and punctuation should be introduced. Some faulty grammatical constructions in common use, and vulgarisms, should be submitted for correction.

15.—**ARITHMETIC.**—A knowledge of the elementary rules, including the Rule of Three, should be required.

16.—The Local Boards may, with advantage, admit to the previous Examinations, and grant suitable certificates and rewards to, persons of very humble attainments; but the "pass" to the Final Examinations should not be given to any Candidates, however meritorious, whom the Local Boards consider to have no chance of obtaining certificates from the Society's Examiners.

17.—Unreserved communications between the Society and the Local Boards will be requisite to secure to the "passes" of the various Local Boards throughout the Union such an uniformity of value as may be attainable; and it is hoped that their standard may be raised, carefully and gradually, from year to year.

FINAL EXAMINATION BY THE SOCIETY'S EXAMINERS.

18.—Forms containing the names of the "passed" Candidates, and the subjects in which the Society is to examine them, must be returned to the Council not later than the 10th of April, 1860.—(See Form No. 4 in the Appendix).

19.—The Society's Examiners will then set the requisite papers for the final Examination; and these will be forwarded to the Local Boards. The Local Boards will see, and certify to the Council, in the form which the Council will furnish (see Appendix, Form No. 7), that the papers are fairly worked by each Candidate, without copying from any other, and without books or other assistance; and will return the worked papers to the Council.

20.—The final Examination will be conducted by printed papers.

21.—The Examiners will award Certificates of three grades, but Certificates of the first grade will be awarded only to a high degree of excellence.

22.—The final Examinations will be held *simultaneously, on the days, and at the hours, specified in the Time-table for 1860* (Appendix, Form No. 6), at those places where Local Boards are established.

23.—Judgment will then be passed by the Society's Examiners; and the Awards of Prizes and Certificates will be communicated to the parties concerned.

24.—A candidate who has obtained from the Society of Arts a certificate of the 1st class, in any subject, cannot again be examined in the same subject.

25.—A candidate who has obtained from the Society a certificate of the 2nd or 3rd class may, on the recommendation of the Local Board, be examined in the same subject, in a subsequent year, without again passing the previous examination of the Local Board, but his name must always be returned in the proper form (No. 4 in the Appendix).

26.—A candidate who, having obtained a certificate from the Society in any subject, desires to be examined in some other subject, in a subsequent year, may be "passed" by the Local Board, after examination in that subject, without re-examination in the elementary subjects, specified in paragraphs 12, 13, 14, 15.

27.—The following is the list of subjects for the Final Examinations in 1860:—

- I. Arithmetic.
- II. Book-keeping, by Double Entry.
- III. Algebra.
- IV. Geometry.
- V. Mensuration.
- VI. Trigonometry.
- VII. Conic Sections.
- VIII. Navigation and Nautical Astronomy.
- IX. Principles of Mechanics.
- X. Practical Mechanics.
- XI. Magnetism, Electricity, and Heat.
- XII. Astronomy.
- XIII. Chemistry.
- XIV. Animal Physiology.
- XV. Botany.
- XVI. Agriculture.
- XVII. Political and Social Economy.
- XVIII. Geography.
- XIX. English History.
- XX. English Literature.
- XXI. Logic.
- XXII. Latin and Roman History.
- XXIII. French.
- XXIV. German.
- XXV. Theory of Music.

28.—Drawing has been withdrawn from the list of subjects, not because the Council considers that Drawing is unimportant—for everyone ought to be able to draw—but because the Government has provided, in all parts of the kingdom, for the Annual Examination of Candidates in Drawing; and the Council thinks that it would be a waste of resources for the Society of Arts to follow in the steps of the Government with similar proceedings. Ar-

count of the Government Examinations in Drawing is given in the Appendix, page 12.

29.—To indicate the portions of the subjects that will be taken in the Examinations, the Examiners in the several departments have set down certain Text-books. But they desire it to be distinctly understood that in so doing they do not pronounce any opinion as to the comparative merit of the works named. The selection is in many cases determined by the cheapness of the book, or by its being in common use. Real knowledge, however or wherever acquired, will be accepted by the Examiners of the Society of Arts.

1.—ARITHMETIC.

30. Practice—Proportion, Simple and Compound—Greatest Common Measure—Fractions, Vulgar and Decimal—Interest, Discount, and Insurance. The principles of a Decimal Notation in money on the basis of the pound unit.

31.—The Examiners will take into account not only the correctness of the answers, but the excellence of the methods by which they are worked out, and the clearness and neatness of the *working* (which must always be shown). Round, compact figures, as nearly like as possible to old-fashioned printed numerals, will be preferred.

32. Text Books:—Any of the Modern Treatises on Arithmetic, such as Hunter's Text Book (*National Society*), Colenso (*Longmans*), or Barnard Smith (*Bell and Daldy*).

II.—BOOK-KEEPING BY DOUBLE ENTRY.

33. Candidates should be prepared to answer questions as to the nature and use of the different books usually kept in a merchant's office. They should be prepared to journalise a series of transactions from a waste book, and, having posted the entries to the ledger, to balance the accounts, to prove them by a trial-balance, and finally to exhibit an account of profit and loss, with a balance-sheet.

34. Candidates should be prepared to draw the usual commercial forms, such as receipts, bills of exchange, promissory notes, invoices, account sales, accounts current, bills of parcels, and to explain the meanings of technical terms used in general business.

35. Text Books:—Book-keeping, Irish School Series. (*Groombridge*.)

Rudimentary Book-keeping. (*Weale's Series*.)
Kelly's Elements of Book-keeping. (*Simpkins and Co.*)

III.—ALGEBRA.

36. Algebraical Fractions, Square and Cube Root, Greatest Common Measure, Least Common Multiple, Simple and Quadratic Equations single and simultaneous, Ratio, and Variation. Candidates should be prepared to give explanations of Elementary Principles and proofs of Fundamental Propositions.

37. Text Books:—Colenso's Algebra (*Longmans*), or Barnard Smith's Algebra (*Bell and Daldy*).

IV.—GEOMETRY.

38. A facility in solving geometrical theorems and problems, deducible from the first six books of Euclid, will be expected on the part of those who desire to obtain certificates of the first or second class.

39. Text Book:—Euclid, Books I., II., III., IV., VI., XI., and XII. Potts' smaller edition. (*Parker*.)

V.—MENSURATION.

40. The calculation in numbers of the areas and circumferences of plane figures bounded by arcs of circles or right lines. The superficial and solid contents of cones, cylinders, and spheres, &c.

41. Candidates will be expected to be familiar with the different rules of measuring and estimating artificer's work, such as joiner's, bricklayer's, mason's, slater's, and plumber's work, and to be able to prepare estimates of such work from given quantities.

42. Text Books:—Tate's Mensuration. Young's Treatise on Mensuration. (*Simms and M'Intyre*.)

VI.—TRIGONOMETRY.

43. In Plane Trigonometry, the formulæ for the trigonometrical functions of the sum of two angles, the numerical solution of plane triangles, and the use of logarithmic tables, &c.

44. Spherical Trigonometry, Napier's Rules, Solution of Spherical Triangles.

45. Text Books:—Snowball's Trigonometry, (*Macmillan*, Cambridge,) Hall's Trigonometry for Schools, (*Christian Knowledge Society*), or any of the modern treatises on Algebraical Trigonometry. Mathematical Tables (*Chambers' Series*).

VII.—CONIC SECTIONS.

46. The properties of the three curves treated geometrically; also as deduced from the cone. The principles of projection, orthogonal and central, applied to derive the properties of the Conic Sections from those of the circle.

47. Analytical Conics, including the equations of the straight line, the circle, the three conic sections, and the general equation of the second degree.

48. Text Books:—Puckle's Conic Sections (*Macmillan*). Todhunter's Conic Sections (*Macmillan*). Salmon's Conic Sections (*Longmans*). Drew's Conic Sections (*Macmillan*). Howell's Conic Sections, (*Parker*).

VIII.—NAVIGATION AND NAUTICAL ASTRONOMY.

49. A good knowledge of Plane and Spherical Trigonometry, of the definitions and terms used in Nautical Astronomy, and of the various measurements of time and their mutual conversions will be required, as well as skill in the use of logarithmic tables, and neatness, order, and accuracy in the numerical solutions of problems. The candidate should understand the construction of charts; the nature and laws of circular storms; great circle sailing, &c.; the methods of determining the latitude, longitude, variation of the compass, and error and rate of a chronometer by astronomical observations, with the demonstrations of the formulæ employed; the use of Nautical Astronomical Instruments, &c.

50. Text Books:—The Nautical Almanac. (*Murray*.) Riddle's Navigation and Nautical Astronomy. (*Law*, Essex-street.)

IX.—PRINCIPLES OF MECHANICS.

51. The properties of matter, solid, fluid, and gaseous.

Statics: The composition, resolution, and equilibrium of pressures acting on a material particle; constrained particles; machines; attractions.

Dynamics: Gravitation; collision; constrained motions; projectiles; oscillations.

Rigid Dynamics: Motion of a rigid body about a point;—of a free rigid body;—of a system of rigid bodies.

Hydrostatics: Pressures of fluids; equilibrium of floating bodies; specific gravity; elastic fluids; machines; temperature and heat; steam; evaporation.

Hydrodynamics: Motion and resistance of fluids in tubes, &c.; waves and tides.

Pneumatics: Mechanical properties of the air; the barometer.

52. Text books:

Wood's or Todhunter's Mechanics.

Goodwin's Mathematics.

Miller's, Phear's, or Webster's Hydrostatics.

Webster's Theory of Fluids.

Or's Circle of the Sciences.

Golding Bird's Elements of Natural Philosophy by C. Brooke. (*Churchill*).

Lardner's Handbooks on Natural Philosophy.

X.—PRACTICAL MECHANICS.

53. The Application of the Principles of Mechanism to Simple Machines. The Steam Engine.

54. Text Books:—Lardner on the Steam Engine. Nasmyth's Elements of Mechanism, with Remarks on Tools and Machinery. (*Weale*.)

XI.—MAGNETISM, ELECTRICITY, AND HEAT.

55. The Properties of Magnets; Terrestrial Magnetism; Diamagnetism. Statical or Franklinic Electricity; Voltaic Electricity; Electro-dynamics; Thermo-Electricity; the Electric Telegraph.

Conduction, Convection, and Radiation of Heat; Instruments for Measuring Heat; Specific and Latent Heat; Diathermancy.

56. Text Books:—Lardner's Handbooks of Natural Philosophy. (*Walton and Maberly*.)

Golding Bird's Elements of Natural Philosophy, by C. Brooke. (*Churchill*.)

Herschel's Discourse on the Study of Natural Philosophy (*Longmans*) for a general view of the subject.

XII.—ASTRONOMY.

57. The principles of Plane Astronomy.

58. Text Books:—Herschel's Astronomy. (*Longmans*.) First chapters.

Airy's Lectures on Astronomy.

XIII.—CHEMISTRY.

59. Physical. Elementary laws of heat, light, and electricity, in connection with chemical action.

Inorganic. Chemistry of the metalloids and metals, laws of combining proportions, volumes of gases, vapours, &c.

Organic. Composition, properties and decompositions of alcohols, acids, &c.

60. Candidates are expected to be able to explain decompositions by the use of symbols. Questions illustrative of general principles will be selected from the following amongst other trades and manufactures: Metallurgy of Lead, Iron, and Copper; Bleaching, Dyeing, Soap-boiling, Tanning; the manufacture of Coal-Gas, Sulphuric Acid, &c.

61. Text Books:—Fownes' Manual of Elementary Chemistry. Miller's Elements of Chemistry.

XIV.—ANIMAL PHYSIOLOGY.

62. The general principles of Animal Physiology. Practical Application of them to health and the wants of daily life.

63. Text Books:—Carpenter's Animal Physiology, 1859. (*Bohn*.)

Lardner's Animal Physics. (*Walton and Maberly*.)

'Translation' of Milne-Edward's Manual of Zoology. (*Renshaw*.)

XV.—BOTANY.

64. Scientific and Applied Botany. The leading principles of Morphology, Vegetable Physiology, and the Classification of Plants. The Examination will include the characters of important Natural Orders represented in the British Flora; and of indigenous commonly cultivated plants, having noxious or useful properties; also definitions of terms used in descriptive botany.

65. Text Books:—Lindley's School Botany. (*Longmans*.)

Henfrey's Rudiments of Botany. (*Van Voorst*.)

Henfrey's Elementary Course of Botany. (*Van Voorst*.)

XVI.—AGRICULTURE.

66. The theory of agriculture, and such a general knowledge of farm practice, and of the management of live stock, as must, to some extent, have been obtained in the field. The Examination in the theory of agriculture will include both the mechanical and the chemical aspects of the subject; on the one side the advantages and results of tillage operations, and on the other the influence and the operation of particular manures and foods. The questions in farm practice will test a knowledge of the cultivation of our most important crops, and of the management of our principal domesticated animals.

67. Text Books:—Lowe's Elements of Practical Agriculture. (*Longmans*.)

Johnston's Agricultural Chemistry. (*Blackwood and Sons*.)

Morton's Cyclopædia of Agriculture. (*Blackie and Son*.)

Stephens' Book of the Farm. (*Blackwood and Sons*.)

XVII.—POLITICAL AND SOCIAL ECONOMY.

68. Text Books:—Elements of Political Economy, by James Mill. Principles of Political Economy, by John Stuart Mill.

The Phenomena of Industrial Life. Edited by the Dean of Hereford. (*Groombridge.*)

Wheatley's Lectures on Political Economy. (*Parker.*)
69. Some knowledge of the Commercial, Financial, and Statistical History of the United Kingdom will be required, for which "Porter's Progress of the Nation," and "Maculloch's Commercial Dictionary" may be consulted.

N.B.—The Principles of Political Economy, by John Stuart Mill, need be studied only by those who aspire to a first-class Certificate.

XVIII.—GEOGRAPHY.

70. All candidates will be expected to possess a sound knowledge of Elementary Geography, both physical and descriptive. Such knowledge will of necessity embrace an acquaintance with at least the outlines of the great natural features of the globe, the political divisions of countries, and the localities of towns and other places of importance. This kind of knowledge will be looked for in fuller extent with regard to the British Islands, and the various portions of the British Empire, than in respect of other countries. Among the tests applied to it, will be the requirement of the candidate to make, from memory, a sketch, showing the chief features of any particular country in Europe named by the Examiner, and also to sketch a map of the county in which the candidate may be resident. It will of course not be expected that such sketches should exhibit accuracy of detail, but they should at least show the general direction of coast-lines, mountain-chains, or river-courses, with the localities and names of the principal towns. The map of any particular county should embody the chief natural features which the district may include (with the situation of coal-fields, if any), and should have marked upon it any localities which are distinguished as seats of manufacturing or commercial industry.

In addition to the above, candidates who aim at the highest class of certificate should be prepared to answer questions bearing upon Geography in its relation to the Physical Sciences and the History of Mankind—such questions, that is, as involve a general acquaintance with the subject of Climate, the laws of Meteorology, the Distribution of Plants and Animals over the Globe, the leading outlines of Geology, the Ethnographic Division of the Human race, and the commercial resources of different lands. This kind of knowledge is looked for, not in place of geographical knowledge of a more elementary kind, but as supplementary to the latter, and throughout based upon it.

71. Text Books:—

Manual of Geography, by William Hughes. (*Longman and Co.*)

Manual of British Geography, by William Hughes. (*Longman and Co.*)

Guyot's Earth and Man. (*Parker and Son.*)

Mrs. Somerville's Physical Geography. (*Murray.*)

Physical Geography of the Sea, by Maury. (*Philip & Son.*)

Page's Introductory Text Book of Geology. (*Blackwood.*)

The General Atlas (*published by the National Society.*)

The School Physical Atlas (*either Johnstone's, or that published by the National Society.*)

Maps illustrating British Geography (*published by the National Society.*)

XIX.—ENGLISH HISTORY.

72. A general knowledge of the outlines of English History. A special knowledge of English History from the Conquest to the end of the reign of Stephen.

73. Text Books:—Hallam's Middle Ages, chapter viii. (*Murray.*)

Creasy's Rise and Progress of the English Constitution. (*Beniley.*)

The Student's Hume. (*Murray.*)

XX.—ENGLISH LITERATURE.

74. Any two, but not more than two, of the authors in the following list may be taken up for examination:—

Spenser. Faerie Queen, Book 1.

Shakspeare. Julius Cæsar, Henry V., Midsummer Night's Dream.

Milton. Comus, Samson Agonistes, Lycidas, L'Allegro, Il Penseroso, Christmas Hymn, and Sonnets.

Bacon. Advancement of Learning, Book I.

Helps. Essays written in the Intervals of Business.

Wordsworth. The Excursion.

75. Or one of the following works may be taken, with one of the above mentioned authors:—

Craik's History of the English Language.

Trench on the Study of Words.

76. Candidates are recommended to make a very careful study of the text of the authors they may select. The questions on each author will be divided into two sections, the first intended to test the candidate's acquaintance with the text, the second his knowledge of the subject-matter and his critical and literary information. Full marks will not be given for answers to the second section, if those to the first section do not prove satisfactory.

XXI.—LOGIC.

77. Candidates will be expected to answer questions on the different processes of thought, and on the connexion of thought and language; to analyse examples of reasoning on various subjects, and to detect fallacies.

78. Text books: Wheatley's Elements of Logic; Thomson's Outline of the Laws of Thought.

XXII.—LATIN AND ROMAN HISTORY.

79. Livy, Book ii.

Virgil. Æneid, Book vi.

Roman History to the death of Augustus Cæsar.

80. Text Book:—Liddell's History of Rome (in one volume).

XXIII.—FRENCH.

81. The Examination paper will be divided into three parts.

The first will comprise questions on any portion of the French Grammar (to be answered in French, if possible), and an extract from a contemporary French writer to be translated into English. Candidates, in order to obtain a 3rd class certificate, should do full justice to this first part.

The second part will comprise an English extract to be translated into French, and a list of idiomatic expressions to be rendered from French into English, or *vice versa*. This should be done satisfactorily by the candidate who aims at a 2nd class certificate.

In the third part, candidates for the 1st class certificate will have, in addition to the above, to answer properly some *elementary* questions on the three following subjects:

1. French literature from 1830 to 1848.

2. French Weights and Measures, as compared with the English.

3. The Religious Wars in France in the 16th century.

82. Text Book:—Michelet's *Réforme* (volume viii. of his *Histoire de France*).

XXIV.—GERMAN.

83. Schiller's Geschichte des Dreissigjährigen Krieges. Schiller's Gedichte.

Göthe's Egmont.

Kohlrausch's Deutsche Geschichte.

Pieces from each of the above works will be given for translation. Every candidate must translate one piece. First-class certificates will be given to those only who

translate well from English, and write in German a good essay relating to German history since the Reformation.

XXV.—THEORY OF MUSIC.

84. Notation, the modern modes, intervals, time signatures, the stave, transposition, modulation, terms and characters in common use.

85. The Elements of Harmony.

86. Arrangements must be made, in the Previous Examination by the Local Boards, to test Candidates, by oral examination, in their knowledge or appreciation of the *sound* of musical successions and combinations. A form of the test to be used for this purpose by the Local Board at the Previous Examination will be sent by the Council to such Local Boards as may apply for it, in due time before the Examination.

TERMS OF ADMISSION TO THE EXAMINATIONS.

87. Every Candidate for Examination must be "passed" by a Local Board; and (except in the cases provided for in pars. 89, 90, and 92) must be a member of, or student of a class in, an Institution in union with the Society of Arts.

88. INSTITUTIONS IN UNION WITH THE SOCIETY OF ARTS may present any of their members or students, above the age of 16, as Candidates for Examination, through the Local Boards, without the payment of any Examination fee.

89. PROVINCIAL UNIONS IN UNION WITH THE SOCIETY OF ARTS may present as Candidates for Examination, through the Local Boards, on payment to the Society of Arts of an Examination fee of 2s. 6d. by each Candidate, any persons, above the age of 16, who may be members of any Institution not in direct union with the Society of Arts, but in union with such Provincial Unions, provided that the Institution has less than 75 members, or an income of less than £75 a year.

90. LOCAL BOARDS, THAT DO NOT EXERCISE THE PRIVILEGE DESCRIBED IN THIS PARAGRAPH, NEED MAKE NO PAYMENT TO THE SOCIETY OF ARTS; but LOCAL BOARDS PAYING ONE GUINEA A YEAR TO THE SOCIETY OF ARTS may admit as Candidates for Examination on payment of the Examination fee of 2s. 6d. by each Candidate, any persons, above the age of 16, who reside, within the limits of such Boards, at any place where there is no Institution in union with the Society of Arts, and no Institution at all, having either 75 members, or an annual income of £75.

91. The whole of the Candidates referred to in the three last preceding paragraphs are understood to belong to those classes which, in the preliminary notice prefixed to this programme, are described as being the classes for whose benefit the Examinations of the Society of Arts are primarily designed.

92. LOCAL BOARDS may also admit as Candidates for Examination any persons, above 18 years of age, who do not belong to the classes last referred to, on payment to the Society of Arts of an Examination fee of 10s. 6d. by each Candidate.

93. It will be seen that provision is made whereby any member of an Institution, any student of a class in an Institution, or in an evening school, or any isolated pupil, or self-instructing student, or any other person, of the required ages, in any part of the United Kingdom, may be admitted to the SOCIETY'S EXAMINATIONS.

PRIZES FOR 1860.

94. The following Prizes are offered to the Candidates, viz.:

One First Prize of £5, and one Second Prize of £3, in each of the twenty-five subjects of Examination.

95. No Prize in any subject will be awarded to

a Candidate who does not obtain a Certificate of the first class therein.

96. The Prize will be given in money or in books, at the option of the Candidate.

97. The following Prizes are offered to the Institutions, viz.:—

To the Institution whose Candidate obtains the above-mentioned First Prize of £5 in any of the 25 Subjects, one Prize of £5. An Institution can take more than one such Prize: but no such Prize can be taken by an Institution unless the Council of the Society of Arts are satisfied that the Candidate, in respect of whom the Prize is claimed, has received in a class at the Institution systematic instruction in the subject for a period of not less than three months.

98. The following Prizes are offered to the Local Boards, viz.:

To the Local Board whose Candidates (not fewer than twenty) obtaining Certificates bear the largest proportion (not less than three-fourths) to its whole number of Candidates;—One Prize of £10.

To the Local Board whose Candidates (not fewer than sixteen) obtaining Certificates bear the largest proportion (not less than three-fourths) to its whole number of Candidates;—One Prize of £8.

To the Local Boards whose Candidates (not fewer than twelve) obtaining Certificates bear the largest proportion (not less than three-fourths) to its whole number of Candidates;—One Prize of £6.

To the Local Board whose Candidates (not fewer than eight) obtaining Certificates bear the largest proportion (not less than three-fourths) to its whole number of Candidates;—One Prize of £4.

99. No Local Board can receive more than one of these Prizes. These sums may be applied by the Local Boards to the payment of the expenses of the Examination, or otherwise, as the Board may deem best for the promotion of the objects for which it was instituted.

100. No Prize of any kind can be awarded to, or in respect of, any of the persons referred to in the second and third paragraphs of the Preliminary Notice.

APPENDIX.*

TIME TABLE FOR 1860.

No Candidate may work more than one paper in each evening.

Tuesday, the 8th May. From 6 to 9 p.m.	Wednesday, the 9th May. From 6 to 9 p.m.	Thursday, the 10th May. From 6 to 9 p.m.	Friday, the 11th May. From 6 to 9 p.m.
Arithmetic. Trigonometry. Magnetism, Electricity, and Heat. Agriculture. English History.	Book-keeping. Navigation and Nautical Astronomy. Conic Sections. Chemistry. English Literature. Music.	Algebra. Practical Mechanics. Astronomy. Physiology. Political Economy. French.	Geometry, Mensuration. Principles of Mechanics. Botany. Geography. German. Latin. Logic.

a Two Papers of one hour and a half each in this subject are considered as one.

* In addition to the Time Table, the appendix contains the forms which will be forwarded at the proper time to the Local Boards, but as these are very similar to those of last year they are not now reprinted in the *Journal*. The tables shewing the results of the Examination have already appeared in the *Journal*, pages 548, 9, 50. The forms and tables appear, however, in full in the separate copies of the Programme, which are printed for distribution.

THE GREAT EASTERN STEAM SHIP.

On Monday last a banquet was given by the Directors of the Great Ship Company on board this vessel, which is now fast approaching completion, and which is expected to make her first trip early in September next. A large party of near five hundred persons was entertained on board, under the presidency of the Chairman of the company, Mr. Campbell. Steam was got up, and the company had the gratification of witnessing the first introduction of steam into her enormous engines. Her trial trip will be from this country to America, but it must be understood that so short a voyage is no test of her powers. It is for long voyages that her special qualities are valuable. It is expected that she will make the voyage to India in from 32 to 36 days; to Australia, in a proportionately longer time, in each case carrying coals sufficient for the voyage out and home.

The dimensions and particulars of the ship are as follow:—

Length between perpendiculars	...	680 ft.
Length over all	...	695 ft.
Length of beam	...	83 ft.
Length over paddleboxes	...	120 ft.
Height from bottom of ship to top of iron of upper deck	...	58 ft.
Diameter of paddle wheels	...	56 ft.
Diameter of screw propeller	...	24 ft.
Number of blades to ditto	...	4
Draft of ship when laden and ready for sea	...	30 ft.
Paddle engines' nominal horse power	...	1,200
Screw engines' ditto	...	1,800
Diameter of screw engine cylinders	...	84 in.
Diameter of paddle engines ditto	...	74 in.
Length of stroke to paddle engines	...	14 ft.
Ditto of screw engines	...	4 ft.
Total number of boilers	...	10
Weight of iron in the hull of ship	...	7,000 tns.
Weight of ship with machinery, coals and cargo	...	26,000 tns.

She carries six masts, three square-rigged, and three rigged fore and aft. The three centre square-rigged masts are of iron. Each is made of hollow wrought iron in eight-foot lengths, strengthened inside by diaphragms of the same material. Between the joints, as they were bolted together, was placed a pad of vulcanised indiarubber, which gives a spring and buoyancy to the whole spar greater than wood, while at the same time all the strength of the iron is retained. The breaking strain of the six shrouds to each of these masts is over 300 tons, which gives ample security for the masts being properly supported, as the weight of each is only 22 tons. On deck are four small steam winches or engines, each of which works a pair of cranes on both sides of the vessel. And the value of the invention may be estimated when it is expected that with these four double cranes alone 5,000 tons of coal can be hoisted into the vessel in 24 hours. The paddle engines are by Mr. J. Scott Russell, the screw-engines by Boulton and Watt. The paddle engines consist of four oscillating cylinders, of 74 inches diameter and 14 feet stroke; each pair of cylinders, with its crank, condenser, and air pump, forms in itself a complete and separate engine, capable of easy disconnexion from the other three, so that the whole is a combination of four engines. A friction clutch connecting the two cranks is the means by which the engines are connected or disconnected. The paddle engines work up to an indicated power of 3,000 horses of 33,000lb., when working 11 strokes per minute with steam in the boiler at 15lb., the expansion valve cutting off at one-third of the stroke. All the parts, however, are so constructed that they will work smoothly either at eight

strokes per minute at 25lb. without expansion (beyond what is unavoidably effected in the slides), or at 16 strokes a minute with the expansion valve cutting off at one quarter of the stroke. Under the latter circumstances the paddle engines alone would give an indicated power of 5,000 horses. The boilers are immensely strong, and have been tested to double the pressure they are required to bear. Their weight, including donkey engine, pumps, funnels, &c., is 210 tons, and they are capable of containing 156 tons of water. Each set has about 8,000 square feet of tube surface, exclusive of flue or furnace, and about 400 square feet of fire-bar surface. Each is equal to supply freely with moderate firing steam for an indicated horse power of 1,800 when working with 15lb., but with full firing can supply an indicated horse power of 2,500. The fireplaces and ash pits are fitted so as to be well adapted for the use of anthracite coal.

The screw engines are constructed on the same improved principles. They have four cylinders of 84 inches diameter and 4 feet stroke. The cylinders are capable of being worked together or separately. When working 45 strokes a minute, with steam on at 15lb. and cutting off at one-third of the stroke, these engines give an indicated power of 4,400 horses, but at 55 strokes a minute, steam on at 25lb., and cutting off at one-quarter of the stroke, the power will reach to 6,500 horses. Thus the united efforts of both screw and paddle engines will drive the immense vessel through the water with a power of no less than 12,000 horses, and at a speed which is calculated at from 22 to 23 miles per hour. The screw engine boilers are in three distinct sets. Their weight is 362 tons, and their capacity for water 270 tons. The probable consumption of coal when both engines are at full work will average 250 tons per day. The cellular compartments at the bottom of the ship will be used for pumping water into instead of ballast, and as the webs subdividing these are perfectly water tight, any one or any number can be filled at pleasure.

The importance of this gigantic undertaking cannot be overestimated; if the ship be successful, and the Company are most sanguine that she must be, both commercially and mechanically, she will not long be without followers. She has been about five years in building. That she has been built is due to the commercial enterprise of Mr. Campbell, Mr. Jackson, and other capitalists, who had confidence in the skill, energy, and ability of Mr. Brunel (the originator of the idea), and of Mr. J. Scott Russell, to whom has been entrusted the planning, building, and construction of the ship, and to the indomitable perseverance, industry, and business habits of Mr. John Yates, who was Secretary of the original Company from the commencement, until the vessel lately passed into the hands of the Company to which she now belongs.

In connection with this subject, and the great growing importance of steam in the commercial navy, the following article is extracted from the *China Telegraph*:—

“In the recent agitation by the British shipowners, on the alleged depression of British shipping, one very important feature and influencing cause was entirely overlooked, or purposely kept out of sight; and yet it forms a leading element in the inquiry as to the present position of our mercantile marine. The great shipowners who took so prominent a part in the movement, clinging to antiquated notions and the fashions of the good old times, ignored altogether the progress and influence which steam has exercised on the carrying trade of the world. For aught that transpired then, the world would have supposed there was no such thing as a steamer afloat; or that the commerce of the globe had in nowise benefitted by the immense steam fleet now in movement, and by which we hold the principal ocean traffic. Those who still cling to the heavy goods train, while the express lines of paddle and screw are traversing every sea, must,

like the canal-owners and stage-coaches, expect to be distanced in the race.

The strides which the British steam marine has made in the last few years are so gigantic, and probably so little appreciated by the public at large, that it may be well to take a survey of the figures, for present comparison and future reference.

Fifty years have not elapsed since the whole steam navigation of the British Empire was concentrated in the little *Comet*, a vessel of forty feet keel, and ten and a-half feet beam; and now the steam-fleets of Britain—thany of the ships being floating palaces—are sweeping all seas, and connecting the ends of the earth, for the purposes of mutual benefit. We have gone on gradually enlarging and improving our build of steamers, until we have now afloat—if not yet at sea—a vessel of 680 feet keel, 83 feet beam, of 23,000 tons burden, and capable of being worked up to 10,000 horse-power. The sky of every navigable stream and inland lake is now darkened with the smoke of the steamers. Local coasting, and river steam companies, are now to be found throughout the world. Commencing at the antipodes, our Australian colonies possess a very respectable mercantile steam fleet. Steamers run between the New Zealand islands and the Australian ports; between Tasmania, Port Phillip, Sydney, and Port Adelaide. Steamers navigate the Hunter's River, the Illawarra, the Murray and its tributaries, the Darling, and Murrumbidgee. Steamers communicate with Singapore, and the islands of the Eastern Archipelago, and are met with in the Chinese ports, and on the Canton, Yellow, and Amoor rivers. In British India, steamers now traverse the Irrawaddy, the Ganges, the Jumna, the Indus and its tributaries, and the navigation of others gradually being opened up by steam. The Indian ocean and the Red Sea have become steam highways. The Mauritius and Ceylon now own local steamers. Even African commerce in the far interior is at the present moment subserved by steam, for steamers are found on the waters of the Orange River, the Zambeze, and the Niger, as well as at all the leading ports on the western coast, and on the south eastern shore, from Table Bay to Natal. In South America steamers now run on the Paraguay, the Amazon, the Magdalena, and some other rivers; while, proceeding northwards, almost every available lake and river is turned into a channel of commerce by steam power. Nicaragua to the Canadian lakes, and thence to California and British Columbia; the St. Lawrence, the Ottawa, the St. John, and even some of the rivers of the Hudson's Bay territory, are now navigated by British steamers. We need not go into detail here as to the progress the Americans have made in steam on their inland waters. Their vessels are of a different class, and though well adapted for the purposes intended, not to be compared for build, durability, and general construction, with British built steamers. The Panama route to Australia has been repeatedly pressed upon public notice here and in the colonies, but British shipowners have perseveringly refused to attempt it. Forced on, however, by the colonial grants made by the Sydney and other legislatures, the Home Government at last has invited tenders for the mail service across the Pacific, which will, we trust, lead to an early fortnightly communication with Australia, and to a closer steam connection with Japan and China, and the Eastern Archipelago. The value and importance of regular steam communication with our colonies and foreign countries, even with the heavy annual subsidies paid, and the extraordinary impetus it has given to commerce, are too well understood and appreciated to require enlarging on.

The introduction of screw propulsion in 1839 soon directed attention to that system for merchant vessels, and the progress was so rapid, that in 1854 there were more than 200 commercial screw ships registered in the United Kingdom. England using now steam-power on the ocean more extensively than other countries, suffers less from the derangement of commerce than they do.

The increase of screw-steamers, and their general employment on voyages of short extent, or where coaling facilities can be secured, has made a rapid revolution in the nature of our shipping, and contributed to keep down the prices, and to depress British sailing-vessels. Steam, which has long held the monopoly of the mails, light goods, and the chief part of the passenger traffic, is now engrossing a large share also of the merchandise transport from the United States, from South America, from Africa, and even from India. We cannot but express our astonishment that screw-steamers are not yet established for the conveyance of tea and silk from China. If the merchants and shippers find steamers to be more speedy, regular, and certain, it is but natural that they will have the preference over sailing-vessels, even at a slightly enhanced charge for freight. The great demand for steamers of a large size for ocean and river navigation, coupled with the application of the screw, and the adaptation of iron for the hulls, has almost transferred the construction of steamboats from the hands of the shipwright to those of the hammerman and the engineer. By far the largest proportion of steamers now built are constructed of iron, and a considerable number of sailing vessels are also built of iron. Of 247 steam-vessels built in the Clyde during the seven years anterior to 1853, 14 were of wooden hulls, and 233 of iron. The aggregate burthen of the wooden steamers amounted to 18,331 tons, that of the iron to 129,273. In 1857, there were 155 steam-vessels, of 49,940 tons, built of iron, out of 228 vessels and 52,918 tons constructed in that year; and there were also 38 sailing ships, of 13,351 tons, built of iron. But we not only build for ourselves, we also supply steamers for foreigners. In 1855, we built 45 steamers, of 25,854 tons, for foreigners; in 1856, 69 of 32,976 tons; and in 1857, 93 of 34,676 tons. Celerity and certainty of transit in the conveyance of mails, passengers, and light goods, being considered of paramount importance, has led to a large increase not only in our subsidised mail steam lines, but in private steam-vessels, dispatched periodically to various European and foreign countries. Although our coasting trade has been thrown open now to foreigners for several years, there were only 50,359 tons of foreign shipping engaged in it in 1857, and the large proportion of foreign-owned vessels that took part in the foreign carrying trade sailed under the American flag. The speed and general capacity of our steamers has greatly increased, and hence their voyages are more frequent, and they become more formidable competitors to the sailing ships. These facts will at least serve to convey some idea of the extent and growing importance of our steam marine, and go to prove that it must interfere to a considerable extent with the sailing vessels, by outstripping them, and carrying off a considerable portion of the passenger and goods traffic from distant parts. To have shown what great improvements in the build, speed, increased tonnage, safety, and passenger accommodation have been made in steam-vessels, would have carried our observations too much into detail."

It is singular to note, notwithstanding the magnitude of the subject and the great interests involved in it, that no journal has hitherto been specially devoted to it, as the organ of so vast an industry. Almost every interest at the present day has its special advocate. Shipping generally has its organs, but these devote their attention principally to the sailing marine, whilst steam is comparatively neglected. It is understood, however, that a new journal will shortly make its appearance, under the title of the *Steam Shipping Chronicle*, intended as the special advocate of this great national interest. It is proposed to appear fortnightly, and will come out under the auspices of Messrs. Kelly and Co., of the Post-office London Directory, edited by Mr. P. L. Simmonds, whose papers and contributions to the *Society's Journal* on commercial subjects are well known.

EXAMINATION PAPERS, 1859.

(Continued from page 617.)

The following are the Examination Papers set in the various subjects at the Society's Final Examinations, held in May last:—

GEOMETRY AND MENSURATION.

THREE HOURS ALLOWED.

(1.) If one side of a triangle be produced, the exterior angle is greater than either of the interior opposite angles. What series of propositions is necessary to show that the exterior angle is equal to the sum of the interior opposite angles?

(2.) Describe a square that shall be equal to a given rectilinear figure.

The sides of a quadrilateral are 5, 9, 13, 15 feet respectively, and its opposite angles are supplementary, find the side of a square which is equal to it in area.

(3.) Upon a given straight line describe a segment of a circle which shall contain a given angle. If the line is 4 ft. and the angle 30° , what is the area of the segment so constructed?

(4.) Describe an isosceles triangle, having each of the angles at the base double of the third angle. If the base is 4 ft., what is the side of the triangle so constructed?

(5.) Equal triangles which have one angle of the one equal to one angle of the other, have their sides about the equal angles reciprocally proportional.

(6.) The rectangle contained by the diagonals of a quadrilateral inscribed in a circle, is equal to the sum of the rectangles contained by the opposite sides.

(7.) If two straight lines be parallel, and one of them is at right angles to a plane, the other is also at right angles to the same plane.

(8.) Every cone is the third part of a cylinder which has the same base, and is of an equal altitude with it.

(9.) Show that the area of a trapezium, two sides of which are parallel, is equal to the product of the semisum of the parallel sides and the perpendicular between them.

(10.) The interior and exterior diameters of a pipe 20 ft. long are 3 in. and 3.5 in. What is its solid content?

(11.) A cone, the radius of whose base is 3 ft. and altitude 8 ft., has to be covered with sheet lead of 10 lbs. to the superficial foot, at £2 per cwt. What will be the cost of the metal?

(12.) If the diameter of a sphere be 40 ft., what is the solid content of a segment whose altitude is 12 feet?

(13.) What is a rod of brickwork? How do you find the number of bricks in a given surface and thickness?

A wall 20 ft. long has 3 footings, each $\frac{3}{4}$ ft. high. Their respective thicknesses are 4, $3\frac{1}{2}$, 3 bricks; it then rises 8 ft. $2\frac{1}{2}$ bricks thick; then 10 ft. 2 bricks in thickness; then 6 ft. 1 brick in thickness. What will it cost at 12 guineas per rod?

(14.) A room consists of a rectangular part, 24 ft. by 16 ft., and two semicircular ends; its height is 18 ft.; what will it cost to paint the walls at 10d. per square foot, deducting two doors each 4 ft. 6 in. by 8 ft. 4 in., two windows each 10 ft. by 12 ft., and one fireplace 5 ft. by 6 ft.?

(15.) A sash weighing half a hundred weight has to be balanced by two cast-iron weights, cylindrical, and 3 in. in diameter. What will be their lengths, if a cubic foot of cast iron weigh 7,066 oz.?

(16.) If two sides of a triangle be given, the triangle will be greatest when they contain a right angle.

(17.) A B C is a triangle having acute angles at B and C, draw A D perpendicular to B C, and join D with the middle points of A B, A C. Show that the triangle is now divided into four isosceles triangles.

(18.) If a chord of a circle be produced equally both ways, and tangents be drawn from its extremities on opposite sides of it, the line joining the points of contact shall bisect the chord.

(19.) If any number of parallelograms be inscribed in a given parallelogram, the diameters of all the figures shall cut one another in the same point.

(20.) The diagonals of a trapezium, two of whose sides are parallel, cut one another in the same ratio.

(21.) In a complete quadrilateral, each diagonal is harmonically divided by the other two.

TRIGONOMETRY.

THREE HOURS ALLOWED.

(1.) Explain the two kinds of angular measure used in Trigonometry; and express the unit of "circular measure" in degrees, &c.

(2.) Trace the values of the cosine of an angle through the four quadrants; and show that

$$\begin{aligned}\tan. A &= \tan. (2n 180^\circ + A.) \\ &= -\tan. (2n + 1 180^\circ + A.) \\ &= -\tan. (2n 180^\circ - A.) \\ &= \tan. (2n - 1 180^\circ - A.)\end{aligned}$$

(3.) Prove the formulæ:—

$$\begin{aligned}\sin. \frac{A}{2} &= \frac{1}{2} \sqrt{1 + \sin. A} - \frac{1}{2} \sqrt{1 - \sin. A} \\ \sin. (60^\circ + A) - \sin. (60^\circ - A) &= \sin. A \\ \sin. (A + B) \sin. (A - B) &= \sin. 2A - \sin. 2B\end{aligned}$$

(4.) Find the values of $\sin. 18^\circ$, and $\cos. 9^\circ$.

(5.) Show that if $\tan \theta = \sqrt{\frac{x}{a}}$,

$$(1.) \sin.^{-1} \sqrt{\frac{x}{a+x}} - \cos.^{-1} \sqrt{\frac{a}{a+x}} = 0$$

$$(2.) \sin.^{-1} \frac{1}{\sqrt{5}} + \cos.^{-1} \frac{1}{3} = 45^\circ$$

(6.) Prove that in any plane triangle

$$c^2 = a^2 + b^2 - 2ab \cos. C,$$

and adapt the formulæ to logarithmic computation.

(7.) How may the sines of small angles be computed? Exemplify the method by computing $\sin. 15''$.

(8.) If a, b, c are the sides, and A, B, C the angles of a plane triangle, prove that

$$(1.) \sin. \frac{A+B}{2} = \frac{a+b}{c} \sin. \frac{C}{2}$$

$$(2.) \text{The area} = \frac{2abc}{a+b+c} \cos. \frac{A}{2} \cos. \frac{B}{2} \cos. \frac{C}{2}$$

(9.) If $a = 70, b = 35$, and $A = 37^\circ 30'$, find B , having given

$$\log. \sin. 37^\circ 30' = 9.7844471. \quad \log. 2 = 3010300$$

$\log. \sin. 17^\circ 43' = 9.4833165$; and diff: for $1' = 39.52$ and show how c may be found.

(10.) Two men are surveying; when each is at a distance of 200 yards from the flag-staff, one finds the angle subtended by his companion and the staff to be $72^\circ 17'$; determine the distance between them, taking the logarithms in the preceding question.

(11.) Find the 216th root of .03549, having given

$$\log. 3459 = 3.5501060$$

$$\text{and } \log. 99.3237 = .997075$$

(12.) Solve the right angled triangle, whose right angle is C ; when $a = 100, c = 196, \log. 7 = .8450980$.

$$\log. \sin. 30^\circ 40' = 9.7076064$$

$$\log. \sin. 30^\circ 41' = 9.7078194$$

(13.) If two sides of a spherical triangle are equal, the opposite angles are also equal.

(14.) If a, b, c are the sides, and A, B, C the angles of a spherical triangle, show that

$$(1.) \frac{\sin. A}{\sin. a} = \frac{\sin. B}{\sin. b} = \frac{\sin. C}{\sin. c}$$

$$(2.) \cos. a = \frac{\cos. B \cos. C + \cos. A}{\sin. B \sin. C}.$$

(15.) Enunciate and prove Napier's analogies

(16.) In a right-angled spherical triangle $\cos. c = \cos. a \cos. b$: prove this theorem, and deduce from it the corresponding theorem of plane trigonometry

(17.) Prove that there are only five regular solids.

SOUTH AMERICAN PRODUCTS.

The following letter has been received from a correspondent at Carthagea :—

SIR,—In a case of plants that I had occasion to forward, through the Secretary of the Admiralty, to Dr. Hooker, I have enclosed some specimens which I supposed would be interesting to you or your members, with request a to hand them to you. They consist in:—

No. 3. One strap of the liber of an enormous tree, 100 to 150 feet high, by 6 to 12 feet diameter, without branches up to the top.

No. 9. Some leaves of the same tree as used to make ropes in this country. This would do, I think, for paper material.

No. 4. Panama palms in their natural state.

No. 5. Panama palms accidentally steeped.

No. 6. Panama palms as prepared to make hats.

No. 7. A rope of the liber of a tree after being steeped—tied with the same liber in its natural state—which both seem suitable materials for paper-making.

No. 8. Leaves and fibres of leaves of our wild pine apple.

I have ordered some tons of those different materials, and were it not for the news of war, I should now be in England, to have a trial made of their value.

I have put at the disposition of Mr. Routledge, of the Eynsham paper works, who is an active member of your Society, a bag of the liber No. 3—but so far got no answer.

If those specimens should prove interesting to any persons, I shall be obliged by your giving them my direction, for further particulars.

I remain, &c.,

A. ANTHOINE.

Carthagea, 25th of June, 1859.

The specimens alluded to are now at the Society's House, for the inspection of members and their friends.

ANTIDOTE FOR SNAKE BITES.

In the *Melbourne Examiner*, of the 14th of May last, is an account of a public trial of the value of an antidote for snake bites, said to be known to a Mr. Underwood. The experiments were made in the rooms of Messrs. Easey and Co., auctioneers, Collins-street, in the presence of about 500 spectators. The snakes employed by Mr. Underwood were a whip-snake, about 15 inches long, and two diamond snakes, one about 20 inches, the other 3½ feet in length. The larger of the diamond snakes Mr. Underwood provoked till it bit himself on the lower part of the fore-finger. A rabbit was bitten several times by the whip-snake, but neither the rabbit nor Mr. Underwood appeared to be in any way inconvenienced by the bites. The experiments were declared, however, not to have been satisfactory, and the secret of the antidote was not revealed.

In another page of the same journal is inserted the following extract from the *Hobart Town Mercury*:—

"According to the *Cornwall Chronicle*, 'the secret so long confined to the heart of Underwood,' in reference to his antidote to the bite of snakes, has at length been discovered, and the common male fern—*polypodium filix mas*—is stated to furnish the remedy. This very common plant has been long known as a specific in the cure of worms, especially the tapeworms—the powdered root being generally used for this purpose; but from circumstances which have transpired it would appear that Underwood uses a decoction, or broth, of the leaves near the root as being stronger, perhaps, than those near the apex of the plant. We believe in the efficacy of this remedy, which may be easily tested by experiments on animals, and its power might perhaps be augmented if used in the form of a tincture—that is, with an ounce of the leaves steeped for a fortnight in a pint of rum or

brandy, in which state it could be kept for any length of time, if well corked, without deterioration by fermentation or otherwise. The fern is common in all parts of the island, and may be gathered at any time, so that an antidote so serviceable may be in the hands of everyone."

Home Correspondence.

THE EXAMINATIONS FOR 1860.

SIR,—I feel sure that I express the feelings of many thousands throughout the kingdom, in returning thanks to the Council of the Society of Arts, for their very liberal interpretation of the first resolution which I moved at the last Annual Conference. By extending the privileges of the Examinations to the members of Institutions having an income less than £75 a year by the payment of 2s. 6d. for each candidate, the advantages will be extended to very many who would otherwise be debarred from such an incentive to mental improvement, and I have no doubt it will be found that by such a step the Society of Arts has done more to demonstrate its practical usefulness than by anything previously attempted in the same direction.

It now remains for those who are interested in the extension of the scheme to remove one of the difficulties alluded to in the second resolution, by giving as full publicity as possible to the formation of Local Boards, and the conditions on which they may be made available for their intended purposes, so that as many as possible may take advantage of them. The concessions made by the Council of the Society of Arts might be briefly stated in a handbill, and widely distributed in every locality affected by their operation, and as the expense would be comparatively trifling, it is to be hoped that many will be found not unwilling to incur so small a charge in order to accomplish so great a good. A reference for further information might be made to the secretary of the neighbouring Institution, and the projected benefits appealed to when a canvass is made for new members. If this be energetically carried out with a zeal proportioned to the importance of the object to be gained, the Society of Arts will find no reason to regret that they opened their doors to those who would otherwise have been unable to pay for admission; and the increasing number of candidates will prove that the people of this country are not regardless of the blessings of mental cultivation when fairly placed before them.

In thus acknowledging the debt of gratitude which is due to the Council of the Society of Arts, I am not surrendering the opinion I have previously expressed as to the importance of a more systematic organisation of Local Boards, and the advantage of a more impartial supervision of the final examinations.

I am &c.,

BARNETT BLAKE.

Leeds, 9th August, 1859.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

PAR. NO.

Delivered on 21st July, 1859.

60. Bills—Universities Incorporation Act Amendment.

63. " Medical Acts Amendment.

64. " Thames Conservancy.

Customs—3rd Report of Commissioners.

Delivered on 22nd July, 1859.

96. Justices of the Peace—Return.

99. Magistrates (County Palatine of Lancaster)—Return.

55. Bills—Boundaries (Ireland).

65. " Westminster New Bridge.

66. " Local Government Supplemental.

British North America (Exploration by Captain Palisser)—Papers.

Delivered on 23rd and 25th July, 1859.

98. Justices of the Peace (County Palatine of Lancaster)—Return.
 100. Friendly Societies (Scotland)—Report by the Registrar.
 42 (1). Trade and Navigation—Accounts (30th June, 1859),
 103. Caledonian Canal—54th Report of the Commissioners.
 69. Bills—Queen's Remembrancer, &c.
 70. „ Police (Counties and Boroughs).
 71. „ Vexatious Indictments.
 61. „ Fireworks Act Amendment.
 67. „ Locomotive (As Amended by the Select Committee).
Delivered on 26th July, 1859.
 58 (7). Civil Services—Estimates—Class 7.
 101. Civil List Pension—Paper.
 106. Lighting Picture Galleries by Gas—Report of the Commission.
 109. Trinity House Pilots—Returns.
 112. Postal Subsidies, &c. (Canada, &c.)—Return.
 113. New Zealand Loan—Return.
 68. Bill—Income Tax, &c.

Delivered on 27th July, 1859.

116. Locomotive Bills—Minutes of Evidence, &c.
 74. Bill—Military Savings Banks.

Delivered on 28th July, 1859.

94. East India (Public Debts)—Return.
 115. Royal Commissions—Return.
 117. Prussia (Neutrality)—Copy of a Dispatch.
 120. Patents for Inventions—Report of the Commissioners.
 72. Bills—Constabulary Force (Ireland).
 73. „ Adulteration of Food, &c. (Amended).
 75. „ Roman Catholic Charities.
 76. „ County Cess (Ireland) Acts Continuance.
 77. „ Manufactures (Ireland) Act Continuance.
 79. „ Colonial Legislatures' Power of Repeal.
 80. „ Barbuda Government.

Delivered on 29th July, 1859.

58. Civil Services, Estimates—General Abstract.
 110. Licensed Trades—Return.
 105. Bible Board (Scotland)—Return.
 51. Bills—Attorneys and Solicitors.
 Prussia—Lord John Russell's Dispatch.

Delivered on 30th July and 1st August, 1859.

125. East India (26th Native Infantry)—Return.
 124. East India (Public Debt)—Accounts.
 122. New Foreign and Indian Offices—Return.
 121. Military Estimates—Report from Committee.
 114. Military Forces (Colonies)—Return.
 107. East India—Home Accounts.
 104. Foreign Shipping—Amended Return.
 118. Reformatory Schools—Return.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, August 5, 1859.]

Dated 28th June, 1859.

1538. G. Dawes, Milton Iron Works, Hoyland, York, and C. J. Carr, Hoyland—Certain imp. in atmospheric and vacuum hammers and stamps, part of which improvements is also applicable to steam and other engines.

Dated 30th June, 1859.

1560. J. Lawson and S. Cotton, Leeds—Certain imp. in machinery for roving, twisting, and spinning flax, cotton, wool, and other fibrous substances.

Dated 6th July, 1859.

1602. J. Luis, 1B, Welbeck-street, Cavendish-square—An improved mode of manufacture of wheel wires for railway carriages and engines, by means of the therein described apparatus.

Dated 8th July, 1859.

1623. J. Gibbs, Brentford, Middlesex—Imp. in the manufacture of brushes, brooms, coverings for floors, mats, scrapers, and other scraping and rubbing surfaces.

Dated July 12th, 1859.

1652. J. Luis, 1B, Welbeck street, Cavendish-square—Imp. in railway car seats and arm chairs. (A com.)

1653. C. J. Proal, 4, South street, Finsbury—The application of photographic impressions or pictures upon fabrics or tissues, for rendering such fabrics or tissues applicable to various useful purposes. (A com.)

Dated 19th July, 1859.

1698. J. Luis, 1B, Welbeck-street, Cavendish-square—A new system of eccentric socket adapted to axletrees. (A com.)

1702. J. C. Riddell, Belfast—Imp. in stalls, loose boxes, and enclosures for horses, cows, pigs, and other animals.

Dated 20th July, 1859.

1704. T. Curtis, and J. Haigh, Leeds—Imp. in the finishing of cloths.

Dated 21st July, 1859.

1711. J. Todd, Castlemaize, Haddington—Imp. in machinery or apparatus for dressing or cleansing and separating grains and seeds.

1712. G. Welch, Birmingham—An imp. or imps. in the manufacture of frames for mirrors, pictures, and other articles.

1713. I. Robson, Dalton, near Huddersfield—Imp. in means or apparatus for drying and cutting cotton warps after being dyed or sized, or after any other process of wetting, and when quick drying is required.

1715. M. Henry, 84, Fleet-street—Imp. in apparatus or machinery for the manufacture of corks and bungs.

1716. E. J. Scott and S. F. Scott, Glasgow—Imp. in the manufacture of boots and shoes.

1717. H. Healey, Ashby Decey Cottage, near Brigg, Lincolnshire—Imp. in machinery in destroying flies and other insects on growing crops.

Dated 22nd July, 1859.

1718. J. Hartley, Romiley, near Stockport—Imp. in machinery for regulating the velocity of steam and other engines.

1719. J. G. Isham and S. D. Albertson, New York—An improved machine for cutting and shaping bottle and other corks. (A com.)

1720. S. A. Bell and J. Black, Bow-lane, Cheapside—An improved manufacture of fusee.

1721. W. E. Newton, 68, Chancery lane—Imp. in sewing machines. (A com.)

Dated 23rd July, 1859.

1722. J. B. Whitehall, Nottingham, and S. Wheatcroft, New North-road, Middlesex—Imp. in the construction of certain parts of the apparatus or machinery made use of for manufacturing bonnet and cap fronts, rouches, and such like articles of millinery.

1723. H. N. Harrop, jun., Manchester—Certain imp. in a cigar lighter and fusee box.

1724. J. Broadley, Salthaire, Yorkshire—Imp. in means or apparatus used in weaving.

1725. J. Tenwick, Clarendon-street, Portsmouth—Imp. in steering apparatus for ships.

1726. W. H. Hardfield, Fenchurch-street—Imp. in capstans, riding-bits, and stoppers for working with chains.

Dated 25th July, 1859.

1727. H. Ambler, Halfax—Imp. in explosive projectiles.

1728. J. Rowland, jun., and George Hall, Oldham—Imp. in machine or apparatus for sizing yarns or threads, which said improvements are also applicable to dressing machines, or other similar apparatus.

1729. G. Davies, 1, Serle-street, Lincoln's-inn—Imp. in dyeing yarns, threads, or woven fabrics of wool, silk, cotton, linen, or other fibrous or filamentous material. (A com.)

1730. E. Hunt, Glasgow—Imp. in apparatus for indicating and regulating speed.

1731. W. E. Newton, 68, Chancery-lane—Imp. in extracting oil from coal and other substances yielding pyrogenous oils. (A com.)

1732. C. F. Vasseret, 45, Essex-street, Strand—Preventing and removing incrustations in steam boilers. (A com.)

Dated 26th July, 1859.

1733. J. King, Glasgow—Imp. in the treatment of materials used in or resulting from the distillation of spirits.

1735. J. H. Johnson, 47, Lincoln's-lan-fields—Imp. in slide valves for steam engines. (A com.)

Dated 27th July, 1859.

1741. E. Winstanley, Ashton-under-Lyne—Imp. in indicators for registering the quantity produced by spinning machinery.

1743. T. Dickins, Middleton, Lancashire—Imp. in dyeing and discharging warps or other yarns or threads, and woven fabrics of silk, wool, cotton, and other fibrous materials.

1745. C. L. Blum, 29, Boulevard St. Martin, Paris—A mechanical apparatus for smoking and colouring pipes.

WEEKLY LIST OF PATENTS SEALED.

[From Gazette, August 5, 1859.]

August 5th.

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| 154. J. Fawcett. | 376. W. A. Covert. |
| 218. J. G. Proger and D. Davis. | 377. R. J. Ellis. |
| 338. G. F. Chantrell. | 429. R. J. S. Pearce. |
| 346. J. Smith. | 456. W. Clark. |
| 350. J. Hosking. | 468. G. Paul. |
| 356. J. B. Redman. | 505. J. H. G. D. Wagner. |
| 361. E. Wilkins. | 512. C. W. Siemen. |
| 362. J. S. Joseph. | 525. A. Martin and A. Crichton. |
| 368. G. Bower. | 618. W. E. Newton. |
| 369. J. E. McConnell. | 680. A. Mein. |
| 371. E. Herring. | 744. J. H. Johnson. |

[From Gazette, August 9th, 1859.]

August 9th.

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| 386. H. Bruce. | 405. R. Bell. |
| 399. T. White. | 411. J. Wright. |
| 400. J. Bennett and J. Bennett. | 500. R. Mushet. |
| 401. G. Betjemann, G. W. Betjemann, and J. Betjemann. | 501. R. Mushet. |

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, August 5, 1859.]

August 1st.

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| 1854. J. Y. Borland. | 1840. H. W. Wood. |
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[From Gazette, August 9th, 1859.]

August 4th.

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| 1848. J. Keith. | 1885. J. Cartland. |
| <i>August 5th.</i> | 1913. W. Tranter. |
| 1876. T. Whitaker. | 1939. J. Brouard and J. Hubert. |